C. AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

Claim 1 (currently amended) A process for forming diffusion aluminide coatings on an uncoated surface of a substrate, without interdiffusing a sufficient amount of aluminum into a coating layer to adversely affect the coating growth potential or mechanical properties of said coating layer, comprising the steps of:

providing a metal substrate comprising an external surface and an internal passage therein defined by an internal surface, at least a portion of the external surface of the substrate being coated with a coating layer selected from the group consisting of β-NiAl-base, MCrAlX, a line-of sight diffusion aluminide, a non-line-of-sight diffusion aluminide, a pack diffusion aluminide, and a slurry diffusion aluminide on said substrate, wherein the substrate is a gas turbine airfoil, and wherein the internal passage is a plurality of internal cooling passages which extend through an interior of the airfoil;

cleaning the external surface of the substrate;

subjecting the metal substrate to a aluminum vapor phase deposition process performed using a fluorine-containing activator selected from the group consisting of AlF_3, CrF_3, NH_4F, and combinations thereof, at a rate in the range of about 0.036 mols of fluorine per ft^3/hr of transport gas to about 0.18 mols of fluorine per ft^3/hr of transport gas, at a temperature in the range of about 1350°F to about 1925°F, using a transport gas selected from the group consisting of argon, nitrogen, hydrogen, and combinations thereof, the transport gas being provided at a flow rate in the range of about 20 ft^3/hr to about 120 ft^3/hr for a period of time in the range of about 2 hours to about 10 hours; and

cooling the substrate.

Claim 2 (original) The process of claim 1, wherein the coating layer is a β-NiAl-base layer.

Claim 3 (original) The process of claim 2, wherein the coating layer is a β-NiAlCrZr layer.

Claim 4 (original) The process of claim 3, wherein the β-NiAlCrZr coating layer comprises about 53.5 weight percent nickel to about 64.5 weight percent nickel, about 20 weight to about 30 weight percent aluminum, about 2 weight percent to about 15 weight percent chromium, and about 0.5 weight percent to about 1.5 weight percent zirconium.

Claim 5 (original) The process of claim 4, wherein the β-NiAlCrZr coating layer comprises about 60 weight percent nickel, about 27 weight percent aluminum, about 12 weight percent chromium, and about 1 weight percent zirconium.

Claim 6 (original) The process of claim 1, wherein the coating layer is a non-line-of-sight diffusion aluminide layer comprising aluminum, chromium, and a material selected from the group consisting of a reactive element, a noble metal, and combinations thereof.

Claim 7 (original) The process of claim 1, wherein the coating is a pack diffusion aluminide layer comprising aluminum, chromium, and a material selected from the group consisting of a reactive element, a noble metal, and combinations thereof.

Claim 8 (original) The process of claim 1, wherein the coating is a slurry diffusion aluminide layer comprising aluminum, chromium, and a material selected from the group consisting of a reactive element, a noble metal, and combinations thereof.

Claim 9 (original) The process of claim 1, wherein the coating layer is MCrAlX, where M is a metal selected from the group consisting of iron, cobalt, nickel, and combinations thereof.

Claim 10 (original) The process of claim 1 further comprising the additional step of densifying and smoothing the coating layer using a shot peen treatment prior to the step of cleaning the external surface of the substrate.

Claim 11 (original) The process of claim 1 further comprising the additional step of masking a preselected external portion of the substrate prior to the step of subjecting the metal substrate to an aluminum vapor phase deposition process.

Claim 12 (original) The process of claim 1 further comprising the additional step of subjecting the coating layer to a surface finish treatment to reduce the roughness of the coating layer.

Claim 13 (original) The process of claim 1 further comprising the additional step of applying a thermal bond coat to the coating layer.

Claim 14 (original) The process of claim 12 further comprising the additional step of applying a thermal bond coat to the coating layer.

Claim 15 (original) The process of claim 1, wherein the aluminum vapor phase deposition process is performed using an AlF_3 activator at a rate of 0.036 mols of fluorine per ft^3/hr of transport gas, at a temperature of about 1900°F, the transport gas being provided at a flow rate of about 20 ft^3/hr for a period of time of about 6 hours.

Claim 16 (original) The process of claim 4, wherein the aluminum vapor phase deposition process is performed using an AlF_3 activator at a rate of 0.036 mols of fluorine per ft^3/hr of transport gas, at a temperature of about 1900°F, the transport gas being provided at a flow rate of about 20 ft^3/hr for a period of time of about 6 hours.

Claim 17 (original) The process of claim 5, wherein the aluminum vapor phase deposition process is performed using an AlF_3 activator at a rate of 0.036 mols of fluorine per ft^3/hr of transport gas, at a temperature of about 1900°F, the transport gas being provided at a flow rate of about 20 ft^3/hr for a period of time of about 6 hours.

Claims 18 - 27 (Cancelled)

Claim 28 (new) A process for forming diffusion aluminide coatings on an uncoated surface of a substrate, without interdiffusing a sufficient amount of aluminum into a coating layer to adversely affect the coating growth potential or mechanical properties of said coating layer, comprising the steps of:

providing a metal substrate comprising an external surface and an internal passage therein defined by an internal surface, at least a portion of the external

surface of the substrate being coated with a coating layer selected from the group consisting of β-NiAl-base, wherein the β-NiAl-base is β-NiAlCrZr, MCrAlX, a line-of sight diffusion aluminide, a non-line-of-sight diffusion aluminide, wherein the non-line-of-sight diffusion aluminide layer comprising aluminum, chromium, and a material selected from the group consisting of a reactive element, a noble metal, and combinations thereof, a pack diffusion aluminide, and a slurry diffusion aluminide on said substrate, wherein the substrate is a gas turbine airfoil, and wherein the internal passage is a plurality of internal cooling passages which extend through an interior of the airfoil;

cleaning the external surface of the substrate;

subjecting the metal substrate to a aluminum vapor phase deposition process performed using a fluorine-containing activator selected from the group consisting of AlF_3, CrF_3, NH_4F, and combinations thereof, at a rate in the range of about 0.036 mols of fluorine per ft^3/hr of transport gas to about 0.18 mols of fluorine per ft^3/hr of transport gas, at a temperature in the range of about 1350°F to about 1925°F, using a transport gas selected from the group consisting of argon, nitrogen, hydrogen, and combinations thereof, the transport gas being provided at a flow rate in the range of about 20 ft^3/hr to about 120 ft^3/hr for a period of time in the range of about 2 hours to about 10 hours; and

cooling the substrate.

Claim 29 (new) A process for forming diffusion aluminide coatings on an uncoated surface of a substrate, without interdiffusing a sufficient amount of aluminum into a coating layer to adversely affect the coating growth potential or mechanical properties of said coating layer, comprising the steps of:

providing a metal substrate comprising an external surface and an internal passage therein defined by an internal surface, at least a portion of the external surface of the substrate being coated with a coating layer selected from the group consisting of β-NiAl-base, wherein the β-NiAl-base is β-NiAlCrZr, MCrAlX,

a line-of sight diffusion aluminide, a non-line-of-sight diffusion aluminide, a pack diffusion aluminide, wherein the pack diffusion aluminide layer comprising aluminum, chromium, and a material selected from the group consisting of a reactive element, a noble metal, and combinations thereof, and a slurry diffusion aluminide on said substrate, wherein the substrate is a gas turbine airfoil, and wherein the internal passage is a plurality of internal cooling passages which extend through an interior of the airfoil;

cleaning the external surface of the substrate;

subjecting the metal substrate to a aluminum vapor phase deposition process performed using a fluorine-containing activator selected from the group consisting of AlF_3, CrF_3, NH_4F, and combinations thereof, at a rate in the range of about 0.036 mols of fluorine per ft^3/hr of transport gas to about 0.18 mols of fluorine per ft^3/hr of transport gas, at a temperature in the range of about 1350°F to about 1925°F, using a transport gas selected from the group consisting of argon, nitrogen, hydrogen, and combinations thereof, the transport gas being provided at a flow rate in the range of about 20 ft^3/hr to about 120 ft^3/hr for a period of time in the range of about 2 hours to about 10 hours; and

cooling the substrate.

Claim 30 (new) The process of claim 29, wherein the coating is a slurry diffusion aluminide layer comprising aluminum, chromium, and a material selected from the group consisting of a reactive element, a noble metal, and combinations thereof.